

## THE DAVY-FARADAY LABORATORY.

THE late Dr. Mond was keenly interested in the progress of science in all its branches, and his interest exhibited itself in a very practical manner. He was always ready to aid experimenters in carrying out costly researches, and his assistance enabled many young men to pursue original investigations of the most various kinds. Perhaps, however, the most conspicuous instance of his munificent aid to science was his founding of the Davy-Faraday laboratory. This institution was founded and maintained entirely at Dr. Mond's expense; its accommodation was placed at the disposal of investigators of all nationalities, and of both sexes, quite free of charge. It is probable that no institution of a precisely similar character is to be found elsewhere throughout the world; for it is not, in the general sense of the phrase, an educational institution: its staff comprises no one whose duty it is to give instruction, it has remained unconnected with the universities, and no sort of diploma is given to those who have worked there. It was intended to be of service to investigators, qualified by previous training to pursue original researches on their own initiative, and many such investigators have gratefully availed themselves of the facilities afforded to them.

At most institutions which foster original researches, the character of the work done is largely influenced by the professors in charge of the various departments; thus, to mention only one instance, students at the Cavendish Laboratory, Cambridge, have been engaged mostly in investigations connected with the ionisation of gases, under the inspiring influence of Sir Joseph Thomson; but at the Davy-Faraday laboratory, work of the most diverse kinds has been carried on. At the time when the present writer was privileged to occupy one of the rooms provided for investigators, researches were in progress in other rooms on such widely different subjects as the pressure produced during explosions, the rate of melting of ice under various conditions, the vapour pressure of strong solutions, the action of metals and other substances on photographic plates, the properties of platinum black, &c. It is possible that work of this character, ranging over most branches of physical and chemical science, has gained less public recognition than if a more restricted line of research had been pursued; but, for all that, the gain to science has been none the less real and lasting.

The Davy-Faraday laboratory was installed in a house adjoining the Royal Institution, Albemarle Street, and its name was chosen to honour the memory of two investigators whose labours have rendered the Royal Institution famous for ever. It was at first intended to endow the laboratory, and to place it entirely under the charge of the authorities of the Royal Institution; but, owing to some hitch in the negotiations to this end, a change of plan was decided upon: the laboratory was equipped at the expense of Dr. Mond, and a yearly grant was guaranteed for its maintenance, subject to the condition that, in the event of Dr. Mond or his heirs failing to provide this grant within a stated period of its falling due, the laboratory should become the property of the authorities of the Royal Institution.

The house in Albemarle Street was converted into a laboratory, or rather a series of laboratories, at great trouble and expense. A lift was provided for the conveyance of the workers to all floors of the building, and a well-furnished workshop was installed in the basement. In most cases workers occupy separate rooms, supplied with gas, water, and electricity; general laboratories, fitted for ordinary chemical work, can also be used. A wine-cellar was converted

into a room in which researches, demanding constancy of temperature, can be pursued. Balance rooms, and rooms for the storage of apparatus and chemicals, were provided. In short, everything was done that could possibly aid in effectively converting a dwelling-house into an up-to-date laboratory. On the other hand, rooms in a dwelling-house can hardly be rendered suitable for certain classes of investigations, however much skill and foresight may be used in their conversion; thus, delicate optical researches are rendered difficult by the shakiness of the building. But for researches in physical chemistry, for which the laboratory was especially designed, the rooms are suited admirably; and most accessories required in such researches, including some of great value, are at the disposal of the workers; in this connection, a Rowland's concave grating, and its necessary adjuncts, may be mentioned. The valuable library in the Royal Institution is placed at the disposal of workers in the laboratory.

The laboratory has been managed by a committee which included Dr. Mond, Lord Rayleigh, and Sir James Dewar as members. This committee selects the candidates who can be accommodated in the laboratory; almost from the first the working space of the laboratory has been fully utilised. The staff of the laboratory includes the superintendent, Dr. Scott, F.R.S., several assistants, and a competent mechanic. When the present writer was working at the laboratory, a delightful *bonhomie* existed between the workers; and with so many specialists on different subjects congregated under one roof, the interchange of ideas was both stimulating and instructive, and one at least of the workers profited from it, and is glad of this opportunity to acknowledge his indebtedness; he is sure that everyone who has been privileged to work in the laboratory will associate the name of Dr. Mond with feelings of lasting gratitude, stronger than it has been possible to express in these brief and inadequate reminiscences of the Davy-Faraday Laboratory.

EDWIN EDSER.

## NOTES.

THE Bakerian lecture of the Royal Society will be delivered on March 17 by Prof. J. H. Poynting, F.R.S., and Dr. Guy Barlow, upon the subject of "The Pressure of Light against the Source: the Recoil from Light."

WE notice with great regret the announcement of the death, at seventy-six years of age, of Dr. E. P. Wright, for many years professor of botany in Dublin University and keeper of the herbarium, Trinity College, Dublin.

DR. H. A. MIERS, F.R.S., principal of the University of London, has been elected a member of the Athenæum Club under the provisions of the rule which empowers the annual election by the committee of nine persons "of distinguished eminence in science, literature, the arts, or for public services."

THE second annual Aëro and Motor-boat Exhibition is to be held at Olympia on March 11-19, under the patronage of the King. Reviewing the list of exhibitors, it appears that the monoplane will predominate, as most of the firms are devoting their attention to this type of aircraft. In addition to the display of actual flyers, some ingenious models will be shown, while to the lover of mechanics the engines for aeronautical purposes will be of interest.

THE University of Kansas has lost its professor of mathematics by the sudden death, in his fiftieth year, of Prof. H. B. Newson. Prof. Newson was the managing editor of the University's Science Bulletin, and was the

author of numerous research articles in pure mathematics. He was a member, not only of the American Mathematical Society, but of the Deutsche Mathematiker Vereinigung and the Circolo Matematico di Palermo.

THE ninth annual general meeting of the Association of Economic Biologists will be held at the University of Manchester on July 6-8, under the presidency of Prof. G. H. Carpenter. A detailed programme will be issued in due course; in the meantime, further particulars may be obtained from the honorary secretaries, Mr. W. E. Collinge, Uffington, Berkhamsted, or Mr. W. G. Freeman, 28 Burnt Ash Lane, Bromley, Kent. Mr. J. Mangan, of the University of Manchester, will act as local secretary.

FROM a Lick Observatory Bulletin we regret to learn of the death, at eighty-five years of age, of Mr. D. O. Mills, to whose generosity American astronomy—and higher education—owes very much. Mr. Mills was a member of the first board of trustees, appointed by James Lick, to superintend the construction and equipment of the Lick Observatory. To his benefactions the observatory was indebted for the two exceptionally fine spectrographs, used in connection with the great refractor, and he also provided the means necessary for the D. O. Mills expedition to the southern hemisphere, by which the observatory at Santiago, Chile, was established. His gifts to, and work for, the cause of higher education were also remarkable, both for the lavish manner in which they were freely given and the acute discernment which governed them.

THE following officers of the Pellagra Investigation Committee have been selected:—chairman, Sir T. Lauder Brunton; vice-chairman, Dr. F. M. Sandwith; honorary secretary and treasurer, Mr. J. Cantlie; advisory sub-committee, Mr. E. E. Austen, Prof. E. C. Bayly, Sir William Leishman, Dr. J. M. H. MacLeod, Sir Patrick Manson, Sir John McFadyean, Dr. F. W. Mott, and Prof. Ronald Ross. The field-workers will be Dr. Louis W. Sambon, of the London School of Tropical Medicine, and Captain J. E. Siler, with Mr. Arthur Dawson-Amoruso and Mr. G. C. C. Baldini as assistants. The standing commission for the investigation of pellagra in Bergamo has promised the inquiry every assistance.

THE eighth International Physiological Congress is to be held at the Physiological Institute of the University, Vienna, from September 27-30 next. Communications for the congress should be sent to Prof. O. v. Fürth, Physiologisches Institut, Wien IX., Wahringerstrasse 13. An exhibition of physiological apparatus is to be held from September 26 to October 1, and a special congress committee has been appointed to organise it; applications for permission to exhibit apparatus should be sent to Herrn Hofrat H. H. Meyer, Pharmakologisches Institut, Wien IX., Wahringerstrasse 13. Prof. E. B. Starling, F.R.S., of University College, London, is one of the general secretaries to the international committee, and Prof. Sigmund Exner, of the University of Vienna, is the president of the congress.

WE learn from *Science* that arrangements have been completed between Captain R. Amundsen and the Department of Terrestrial Magnetism of the Carnegie Institution of Washington regarding cooperation in magnetic work on the proposed Amundsen Polar Expedition to leave Norway this summer on Nansen's vessel, the *Fram*. After some general explorations in the South Atlantic and in the South Pacific Oceans, the *Fram* is expected to arrive in the summer of 1911 at San Francisco, where her outfit will be completed. The vessel will then be headed for Bering

Sea, and, after entering the polar basin, will drift with the ice. It is expected that it will be about four years before she emerges again from the ice. While Captain Amundsen hopes that his vessel will drift across the North Pole or close thereto, his prime object is that of general geographic exploration.

A BILL was introduced in the United States Senate on March 2 to incorporate a Rockefeller foundation in the district of Columbia. Mr. Rockefeller contemplates the endowment of an institution which will be greater even than the Carnegie foundation in educational work. The Senator who introduced the Bill said that Mr. Rockefeller had already given away 10,500,000*l.*, and is now seeking legislative means to dispose of his fortune in a way most likely to benefit mankind. The foundation, according to the Bill, is to be organised to promote the well-being and advance the civilisation of the people of the United States and its possessions, and for the acquisition and dissemination of knowledge; for the prevention and relief of suffering, and the promotion of any and all elements of human knowledge. The amount of Mr. Rockefeller's fortune is not known precisely, but five years ago it was estimated at at least 100,000,000*l.*

THE following list of aviation meetings for the ensuing year is given by the *Deutsche Zeitschrift für Luftschiffahrt*:—March 25 to April 3, Cannes; (date not stated) Biarritz; April 10-25, Nice; April 30 to May 5, Tours; May 10-15, Bordeaux (national meeting); May 7-15, Lyon; May 10-16, Berlin (foreign competitors not disqualified); May 15-23, Marseille (national meeting); May 20-30, Verona; May 27-31, Limoges (national); June 5-22, Vichy (national); June 5-15, Budapest; June 5-12, Juvisy (national); June 18-24, St. Petersburg (foreigners eligible); June 10-26, Rouen; July 3-24, Rheims (French meeting); July 24 to August 4, Brussels; July 27 to August 2, Caen (national); August 6-13, England; August 6-21, eastern circuit; August 25 to September 4, Havre, Trouville; September 9-18, Bordeaux; September 24 to October 3, Milan; October 2-9, Juvisy (national); October 18 to November 2, America; December 4-18, Marseille.

A MEETING of the committee for an Arctic Zeppelin Airship Expedition was held in Hamburg on March 5 under the presidency of Prince Henry of Prussia. It was resolved to ask the Imperial Ministry of the Interior for the services of the Imperial exploration steamer *Poseidon* for ten or eleven weeks. The members of the expedition intend to start for Spitsbergen on July 1, and there to transship to the *Poseidon*. At the same time dashes are to be made into the polar ice with the hired Norwegian iceship *Phoenix* to study the conditions for airship landing. The return will be made about the end of August. The Berlin correspondent of the *Westminster Gazette* states that the original idea of making the primary object of the expedition the reaching of the North Pole has been abandoned; the main purpose is now stated to be the exploration of the unknown regions north of Franz Josef Land and Spitsbergen. Cross Bay, which has been chosen on the ground of data determined by the Prince of Monaco, will be made the base of a number of separate airship voyages which the Zeppelin airship will make. On its way north over Germany and Norway the airship will stop at stations prepared in advance.

A REUTER message from Berlin states that Germany has decided to send out an Antarctic expedition. At a meeting of the Berlin Geographical Society on March 5, Lieut. Filchner was introduced to the meeting as the leader of



the forthcoming German expedition, and briefly outlined his plan of campaign. He proposes that the main expedition shall start from a base on Weddell Sea and advance straight across the Antarctic continent to the Pole. On reaching the Pole the expedition, instead of turning back, will proceed, probably following Sir E. Shackleton's route, to the coast of Ross Sea. Meanwhile, a subsidiary expedition will have landed on the shores of Ross Sea and have advanced inland along Shackleton's route about half-way to the Pole, where, after leaving a dépôt of provisions, it will turn back to the coast. The main expedition, if all goes well, will pick up the dépôt of provisions and join the subsidiary party at the coast. Lieut. Filchner hopes to be able to start in October. He has already had experience as an explorer in Central Asia, where he spent the years 1903 to 1905 in exploring Tibet. He has also done exploration work in the Pamirs and Turkestan. Dr. Penck, president of the Berlin Geographical Society, announced that an anonymous donor had promised 15,000*l.* towards the expenses, and Lieut. Filchner said he had received offers of aid amounting to 3000*l.* If two ships are chartered 100,000*l.* will be required, but if one only is sent out 60,000*l.* will suffice.

THE following are among the lecture arrangements at the Royal Institution after Easter:—Dr. A. Harden, three lectures on the modern development of the problem of alcoholic fermentation; Prof. F. W. Mott, three lectures on the mechanism of the human voice; Prof. A. E. H. Love, two lectures on earth tides; Prof. C. J. Holmes, two lectures on heredity in Tudor and Stuart portraits; Dr. Tom G. Longstaff, three lectures on the Himalayan region; Mr. W. McClintock, three lectures on Blackfeet Indians in North America; Dr. W. Rosenhain, two lectures on the constitution and internal structure of alloys; Major Ronald Ross, two lectures on malaria; Mr. W. W. Starmer, three lectures on bells, carillons, and chimes; Dr. D. H. Scott, three lectures on the world of plants before the appearance of flowers; Prof. J. A. Fleming, two lectures on electric heating and pyrometry (the Tyndall lectures). The Friday evening meetings will be resumed on April 8, when a discourse will be given by Prof. P. Lowell on the Lowell Observatory photographs of the planets. Succeeding discourses will probably be given by Prof. W. J. Pope, Mr. T. Thorne Baker, Dr. Tempest Anderson, Sir Almroth E. Wright, Prof. W. H. Bragg, Sir David Gill, Captain R. F. Scott, the Right Hon. Sir Rennell Rodd, and other gentlemen.

THE director of the Meteorological Office has given notice that from April 1 forecasts of the weather prospects more than twenty-four hours ahead will be issued as opportunity is afforded. Applications have been received at the Meteorological Office from time to time for forecasts of weather several days in advance, in addition to, or instead of, the usual forecasts which refer to the twenty-four hours reckoned from the noon or midnight following the issue of the forecasts. According to the experience of the Meteorological office, the weather conditions do not usually justify a forecast detailing the changes of weather for consecutive days. There are a number of occasions in the course of the year when the distribution of pressure is typical of settled weather, and also occasions when the conditions are characteristic of continued unsettled weather. On these occasions, and on a few others when the sequence of the weather is of a recognised type, a sentence giving in general terms the outlook beyond the twenty-four hours of the definite forecast might be useful to the general public, and, as it could be justified by the statement of definite reasons for the inference, it would come within the general

rules laid down by the office with reference to the issue of forecasts. An indication of the general prospect extending beyond the twenty-four hours' limit is frequently given in the "General Inference" which precedes the forecasts for the several districts on the sheet issued to newspapers. It is expressed in more or less technical language, and the application to the several districts might only be followed by persons acquainted with the terminology used in weather study. It is proposed, therefore, when the meteorological conditions permit, to supplement the forecasts for districts by a remark on the further outlook.

THE summary of the weather issued by the Meteorological Office for the week ending March 5 shows that the conditions were still very mild over the entire country, the excess of temperature being generally from 2° to 3°. The rainfall varied considerably in different parts of the country, but was nowhere very large, whilst there was an excess of sunshine in every part of Great Britain. On nearly all parts of the coast the temperature of the sea-water was warmer than during the corresponding period last year, the difference amounting to between 6° and 7° on the east and south-east coasts of England. The summary of the weather for the winter, comprised by the thirteen weeks ending March 5, shows that the temperature was generally in excess of the average, but not to any great extent. The rainfall was everywhere above the average, the greatest excess being 4.80 inches in the north-west of England and 3.40 inches in the south-west of England. The excess was more than 2 inches in every district of the United Kingdom, except in the north and east of Scotland and in the Channel Islands; the largest actual measurement was 16.49 inches, in the west of Scotland, and the least 7.14 inches, in the east of England. The duration of bright sunshine for the winter was everywhere in excess of the average, the greatest excess being sixty-two hours in the south-east of England, and more than fifty hours in the east and north-west of England and in the Midland counties; the absolutely longest duration was 236 hours, in the south-east of England, and the least 146 hours, in the north of Scotland.

IN *Man* for February Mr. A. M. Blackman publishes some interesting notes on Egyptian antiquities and customs. Several noted tombs of Sheykhs, with the rites performed at them, are described, such as the custom of sleeping in the sacred precincts, as was done at Greek shrines of Asklepius, and of hanging up bandages there as a charm to secure recovery from circumcision and other operations. The Copts, we are told, slay a sheep at the threshold as the bride enters the house. She must take care to cross it without staining her feet or clothes in the blood. Should this occur the marriage is deemed unlucky.

IN the *Gypsy Lore Journal* for January Mr. W. Crooke discusses the ethnographical results of the article published in vol. ii. of the journal by Mr. E. O. Winstedt on "Gypsy Forms and Ceremonies." An examination of this extensive collection of Gypsy rites and ceremonies might be expected to throw light on the supposed Indian origin of the Gypsies. The result is that, except in some not important cases, the analogy with Indian customs is not satisfactorily established. It would seem that most of the customs of the European Gypsies result from their long contact with western peoples, such as the inhabitants of Asia Minor and the Balkan Peninsula.

THE higher classes in India, particularly those who have assimilated some of the culture of the West, have been actively asserting their claims to political and social equality with Europeans. They are confronted with a

similar problem, which is likely to cause no little embarrassment. The depressed classes are now claiming similar rights from their higher brethren. The Pariahs of Madras have formed an organisation, and in Bombay the question is so serious that the Guicowar of Baroda has been moved to advocate more consideration for them. The movement has now spread to Bengal, where the Jugi weavers have issued a manifesto, prepared by Prof. Radha Govinda Nath, urging that they are really sprung from the Yogi ascetics, and are entitled to social status like that of Brahmans. They repudiate the theory generally held that they represent the decayed Buddhist communities, who on the decay of their faith were, like other depressed religionists, compelled to adopt menial occupations. It will be interesting to watch the reception which their claim receives from the Babus of Bengal.

To vol. xi. of the Proceedings of the Washington Academy of Sciences Dr. F. H. Knowlton contributes a paper to prove that the Hell Creek and Ceratops beds of Montana, which have been usually regarded as of Upper Cretaceous age, are really the equivalents in time of the Tertiary Fort Union formation. Evidence in favour of this view is stated to be afforded by the plants, invertebrates, and vertebrates of the formations in question, and the author concludes by the definite statement that the Hell Creek, Somber, and Ceratops beds are stratigraphically, structurally, and palæontologically inseparable from the Fort Union beds, and therefore of Eocene age. To this view Mr. T. W. Stanton, in the same issue, replies that, in his opinion, the Ceratops beds are of Cretaceous age on account of their stratigraphical relations, the pronounced Mesozoic character of the vertebrate fauna and its lack of Tertiary types, and the close relation of its invertebrates to those of the Cretaceous. The admitted relationship of the flora to that of the Eocene is regarded as of minor importance.

IN Nos. 1 and 2 of the Research Bulletin of the State University of Oklahoma Mr. H. H. Lane describes the breeding and placentation of the nine-banded armadillo, and likewise proposes a revised classification of the Edentata. As a rule, this species produces four young at a birth, one for each of the four mammæ, and from the circumstance that in the cases which came under the author's observation the young in each litter were of the same sex, and were contained in a common chorionic vesicle, it is considered probable that they were all derived from a single fertilised egg, and that the sex is determined in the latter. The placenta is of a deciduate type intermediate in form between the zonary and the discoidal, and as this type does not precisely conform to the "placenta zono-discoidalis" of Strahl, it is proposed that it should be known as "placenta zono-discoidalis indistincta." The author divides the Edentata into the Tæniodontia (extinct), Xenarthra, Pholidota, and Tubulidentata. Wortman is considered to be justified—in opposition to the view of W. B. Scott—in regarding the Tæniodontia (or Ganodontia) as represented by the Conoryctidae and Stylinodontidae, in the light of un-specialised ancestral Edentates.

DR. RAYMOND PEARL and Dr. Frank M. Surface have been studying the egg-production of selected fowls with the view of answering the question, "Is there a Cumulative Effect of Selection?" and their conclusions have been published under this title in the *Zeitschrift für induktive Abstammungs- und Vererbungslehre* (Band ii., 1909, Heft 4). Two distinct experiments were made. The first, inaugurated by the director of the Maine Agricultural

Experiment Station and the late Prof. G. M. Gowell, consisted in the continued selection of fluctuating variations with the view of increasing the fecundity. The second dealt with the inheritance of fecundity. The experiments were conducted on a large scale, and yielded extremely interesting, although from the poultry farmer's point of view very disappointing, results. Systematic selection carried on for nine consecutive years yielded no increase in the average production of the flocks, nor was there any decrease in variability as regards egg-production. Egg-producing ability is apparently not inherited; on the contrary, the daughters of hens which laid 200 or more eggs *per annum* actually laid, on an average, a smaller number of eggs than the daughters of less prolific birds. These results seem to have an important bearing on the theory of natural selection.

STUDENTS of cytology who are interested in the dynamical aspects of the phenomena of karyokinesis will welcome a paper on this subject, by Prof. Angel Gallardo, in the *Archiv für Entwicklungsmechanik der Organismen* (Band xxviii., Heft 1), a separate copy of which has been sent to us by the author. Prof. Gallardo interprets the division of the cell as a bipolar phenomenon of an electro-colloidal character. He regards the cell as a complex mixture of positive and negative colloids of different potential, of electrolytes, and of neutral coagulated substances susceptible or not of induction. He considers that the chromatin carries a negative, and the cytoplasmic colloids a positive, charge. The centrosomes are supposed to be capable of acquiring a positive potential higher than that of the cytoplasm. This potential increases through unknown causes, and determines the division of the centrosome. The radiations which appear around the separating daughter-centrosomes are chains of force, formed by the orientation of cytoplasmic microsomes. The trajectories of the centrosomes during separation are the resultants of their mutual repulsion and of the attraction of the nucleus. The chromatin divides during the metaphase by repulsion of its chromosomes under a high negative potential, and the two groups of daughter-chromosomes separate under the double action of their mutual repulsion and of the attraction of the centrosomes. The two new nuclei thus formed attract the positive cytoplasm, and thus determine the division of the cell itself. The paper also contains a useful *résumé* of the views of other writers, such as Hartog and Delage, on this interesting subject.

A FEW years ago we noted with pleasure the commencement of the *Bio-chemical Journal*, and congratulated the editors, Prof. Benjamin Moore and Mr. Edward Whitley, of Liverpool, on their enterprise in starting a periodical in which bio-chemists could publish their researches. The chemical side of biological investigation is well to the fore at the present time; physiologists, pathologists, botanists, and others are devoting themselves to the unravelling of nature's secrets by chemical methods; chairs and lectureships in the subject are being established in our universities and colleges; the subject has a rapidly growing literature of its own, and journals dealing with it are published in Germany and America as well as in Liverpool. The undertaking has met with an unqualified success, and the first number of the fifth volume has just been published. The occasion is signalled by the appearance of the journal in a form more worthy of the matter it prints, both cover and the quality of the paper used being improved. The papers in it indicate the manifold way in which chemical research is invading all branches of bio-chemical study; the first, by Major Sutherland and Captain M'Cay, deals with the influence of salts on hæmolysins, with special

reference to the blood destruction which occurs in the tropical disease known as blackwater fever. This is followed by a note on a new method for determining the alkalinity of the blood, by Drs. Boycott and Chisholm. The editor and his colleagues contribute two important papers, one relating to the bearings of the physical properties of colloids and of adsorption on physiological problems, and the other to the properties of a new sapoglucoside obtained from Mowrah seeds. Papers on the action of ether on the circulation by Dr. Embley, and the influence of the pancreas on glycolysis in muscle by Dr. Simpson, bring the number to a conclusion. We have to congratulate the editors on their success in adding to British scientific literature a journal of such a high standard.

THE advantages offered to students of natural history by the opening of a "mountain" laboratory at Tolland, Colorado, situated at a considerable elevation, yet immediately accessible by train, forms the subject of an article contributed by Prof. F. Ramaley to the University of Colorado Studies (vol. vii., No. 1). Swamp meadow, grass-land, scrub, pine, and spruce forests are found in the immediate vicinity, while a short railway journey up or down gives access to Alpine conditions or vegetation of a warmer region.

A SECOND paper by Mr. E. P. Stebbing on undescribed species of Indian boring beetles of economic importance belonging to the family Scolytidæ is published as the second part of the zoological series of Indian Forest Memoirs. Three species of *Scolytus* were taken on the deodar; in this respect they agree with the American types which infest conifers, whereas the Japanese and European species, including the well-known *Scolytus destructor* of the elm, infest dicotyledonous trees. Four species of *Tomicus* were discovered on different conifers, and a fifth was collected on the sál tree, *Shorea robusta*. Two species of *Pityogenes*, also taken on coniferous trees, are remarkable for their wide distribution.

SYSTEMATIC papers are prominent in the first part of the twenty-fourth volume of Transactions and Proceedings of the Botanical Society of Edinburgh. A short list of seaweeds collected in the West Indian island of Dominica is contributed by Mr. S. Grieve, and Mr. A. Bennett discusses the validity of *Naias flexilis* and *Atriplex calotheca* as British and Scottish species respectively. Miss I. M. Hayward prefaces a list of Tweedside alien plants with the remark that wool is largely imported into the district; this probably explains the presence of two species of *Senecio*, a *Helipterum* and *Atriplex spongiosa*, all Australian plants, and *Cenia turbinata*, a common weed throughout Cape Colony. An anatomical description of thorny aerial roots of the palm, *Acanthorhiza aculeata*, is communicated by Miss B. Chandler. They emerge as soft green roots, but on lengthening shed their root-cap, and eventually become hardened into thorny structures; they function, at any rate in the early stages, as breathing roots.

AN elaborate and extremely useful account of the Indo-Malayan woods, with a systematic enumeration of the trees furnishing them, is presented by Dr. F. W. Foxworthy in the botanical series (vol. iv., No. 4) of the *Philippine Journal of Science*. The author has found it convenient to summarise largely under types known by recognised common names. Attention is especially directed to the great importance of the timbers furnished by trees of the family Dipterocarpaceæ, some of which are hardwoods, others are of soft or medium grades. "Rassak" applies to certain hardwoods yielded by species of *Vatica*

and *Cotylelobium*; "yacal" is obtained from species of *Shorea* and *Hopea*. Softer woods, used for planks and light constructive work, known as "lauan," "meranti," and "almon," are yielded by other species of *Shorea*, *Hopea*, and *Anisoptera*. The family of Leguminosæ also supplies many valuable trees, to mention only the genera *Albizia*, *Intsia*, and *Pterocarpus*. Details are furnished of Philippine ebony trees and substitutes for other standard timbers, and a number of illustrations taken from transverse sections of the woods are provided.

PROF. G. MERCALLI, of the University of Naples, has recently published a valuable report on the Messina earthquake (*Atti del R. Ist. d'Incoraggiamento di Napoli*, vol. vii., 1909), in which special attention is paid to the phenomena exhibited in the south of Calabria. Although there were no immediate precursors of the great shock, at least six slight tremors were felt during the previous month at Messina, Reggio, and other places within the meizoseismal area. The earthquake itself consisted of two shocks, or of two distinct phases, separated by a brief interval, the first part being the longer and the second the more violent, the whole shock lasting about forty seconds. On the map of the central area four isoseismal lines are drawn, the innermost being nearly elliptical, about 18-20 km. long from north to south, and about 10 km. wide, and agreeing closely with the curve laid down by Prof. Omori as bounding the strongly shaken area. The epicentre was evidently submarine, and its position cannot therefore be exactly determined. Prof. Mercalli, who has made a special study of the Calabrian earthquakes, states that two of the after-shocks of the great earthquake of 1783 originated in the same centre as the Messina earthquake, as well as four other shocks in the years 1509, 1599, 1780, and 1876.

THE current number of *Science Progress* contains the first part of a paper on recent hydrobiological investigations, by Mr. James Johnstone, of the Liverpool University Fisheries Laboratory. The paper deals with the results of the international explorations of the seas of north-western Europe, more particularly with those set forth in the papers of Nansen and Helland-Hansen, and examines the relation between the "Gulf Stream" (by which, it appears from the paper, is meant the Norwegian branch of the "Gulf Stream drift") and climate and crops in northern Europe. The series of curves worked out by Nansen and Helland-Hansen showing the remarkable parallelism between air temperature and sea temperature, growth of fir trees, and yield of various harvests in Norway is illustrated. In the absence of further investigation in lower latitudes in the open Atlantic it is still quite uncertain how far the sea temperature is determined by the varying proportions in which the northward moving water is derived from the equatorial currents, and the relations of cause and effect are still so obscure that it seems premature to conclude that it is "inevitable that the yield of the land-crops depends on the temperature of the sea."

A SOMEWHAT novel treatment of the hydrodynamical equations representing the general circulation of the atmosphere is given by Mr. F. R. Sharpe in the *American Journal of Mathematics*, xxxii., 1. Besides writing down, in polar coordinates, the equations of flow of matter and momentum for a viscous fluid, the author takes, in place of the ordinary adiabatic assumption, an equation representing the flow of energy, which latter is equivalent to the energy equation of the kinetic theory. Making use of the fact that the height of the atmosphere is a small fraction



of the earth's radius, an approximate solution is obtained in the first place neglecting, and in the second place taking account of, the earth's rotation. The author establishes an agreement at least of a qualitative character between the results of his theory and observed facts.

THE *Electrician* for February 11 contains a description, by Mr. P. A. Mossay, of a new arc-lamp known as the Timar-Dreger, which almost dispenses with mechanism and seems incapable of getting out of order. The two carbons are placed horizontally, the positive a few millimetres above the negative, and the arc forms and remains at the ends. To compensate for the want of symmetry of the light, a second pair of carbons is provided which point in the opposite direction to the first. Another new piece of apparatus of interest to illuminating engineers is the Lowden rotary mercury pump, described in the *Electrical Engineer* of the same date. The pump is not unlike the Gaede in general principle, and is much quicker in action than the pumps now used in evacuating incandescent lamps down to pressures at which blackening of the bulb is inappreciable.

FIVE years ago the geophysics laboratory of the Carnegie Institution of Washington commenced the task of re-determining, on the constant-volume nitrogen scale of temperature, the melting points of the metals from zinc to palladium. The work has now been completed, and the results are given by Messrs. Day and Sosman in the February number of the *American Journal of Science*. A platinum-rhodium thermometer bulb has been substituted for the one of platinum-iridium used in the earlier measurements, and the bulb has been surrounded by an atmosphere of nitrogen at about the same pressure as that in the bulb to prevent diffusion of the gas through the walls of the bulb. Greater uniformity of temperature throughout the furnace in the neighbourhood of the bulb has been secured, as the authors consider that this is the chief outstanding error in the use of the thermometer. By means of thermo-couples of platinum-platinum-rhodium standardised by comparison with the nitrogen thermometer they find the following values of the melting points, which may be compared with those of Messrs. Waider and Burgess, of the Bureau of Standards, given in these columns on February 17:—cadmium,  $320.0^{\circ}$ ; zinc,  $418.2^{\circ}$ ; antimony,  $629.2^{\circ}$ ; aluminium,  $658.0^{\circ}$ ; silver,  $960.0^{\circ}$ ; gold,  $1062.4^{\circ}$ ; copper,  $1082.6^{\circ}$ ; nickel,  $1452.3^{\circ}$ ; cobalt,  $1489.8^{\circ}$ ; palladium,  $1549.2^{\circ}$ .

THE first instalment of an article on the stability of flying machines, by Prof. Herbert Chatley, appears in *Engineering* for March 4. The author proceeds to inquire under what conditions such machines may be automatically stable; up to the present, only two types possessing this quality seem to have been discovered, viz. the automatic single-surface glider and the balanced glider. The first relies for its longitudinal stability on the variation of the centre of pressure with the angle of attack; the second relies on the variation in altitude of a balancer or tail surface. In each case a torque should come into existence which will bring the glider back to its original position. The author works out both cases mathematically, and points out for the first case that it is not only  $\phi(\beta)$ , the distance of the centre of gravity ahead of the centre of area of the plane expressed as a function of the angle of attack  $\beta$ , which decides the stability, but the rate of change of the torque  $M$  produced by a small alteration in  $\beta$  owing to a change in the velocity. There seems no doubt that surfaces which are concave on the under side are not stable without some balancing device. The question of oscillations is also discussed in this article.

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BULLETIN No. 34, issued by the Engineering Experiment Station of the University of Illinois, contains an account of tests on a water-tube boiler having two types of tile-roof furnaces. The tests were conducted by Mr. J. M. Snodgrass, and in the first four the tubes of the lower row were completely surrounded by the tiles which formed the roof of the furnace; in the other four tests the under sides of the tubes were exposed to the action of the furnace gases, the roof tiles resting on the tops of the tubes. The last four tests show a slightly higher efficiency, more uniform fire control, and a lower temperature in the furnace, combustion chamber, and stack as compared with the first four tests. The covered tubes were shown to be superior in the matter of smokelessness. About 5 per cent. more water per pound of coal was evaporated with the exposed tubes, and the temperatures in the furnace and combustion chamber were found to be from  $200^{\circ}$  to  $400^{\circ}$  F. less with these tubes than with those wholly covered. Copies of the bulletin may be had gratis from W. F. M. Goss, University of Illinois, Urbana, Illinois.

MESSRS. MACMILLAN AND CO., LTD., have published the first part of a "Key to Hall and Stevens's School Arithmetic," prepared by Mr. L. W. Grenville. The price of this part is 4s. 6d.

THE *Amateur Photographer* of March 8 is a special issue, containing a number of fine reproductions of photographs, printed in two colours on art paper, as well as valuable notes on scientific and artistic aspects of photography. The price of this issue is only twopence, notwithstanding these special characteristics.

A POPULAR edition of the "Naturalist on the River Amazons," by the late Henry Walter Bates, F.R.S., has been published by Mr. John Murray at the price of 1s. net. We welcome the publication in cheap form of standard books of travel of this kind as being likely to interest the general reader in the work of scientific naturalists and explorers.

#### OUR ASTRONOMICAL COLUMN.

BRIGHT FIREBALL OF FEBRUARY 27.—Mr. W. F. Denning writes:—"On February 27, at 6.55, a magnificent meteor was observed at various places. It fell slowly, and illuminated objects around like the bright ball of a Roman candle. The meteor is remarkable in two respects, namely, for its unusual proximity to the earth at the end of its career and for the intense green colour exhibited by its nucleus as it sailed down the sky. Several independent observers say the object apparently reached the horizon, or got within  $2^{\circ}$  or  $3^{\circ}$  of it, before it became extinct. Its height was certainly not more than twelve miles at the end of its luminous career, which occurred over a point about twenty miles west of the island of Anglesey. Possibly, indeed, the meteor may have fallen in the Irish Channel, but evidence must be awaited from places nearer the scene of the event than any we now possess.

"The radiant point seems to have been in the N. region of Cancer, and this is a place from which several large fireballs have been directed in past years at the end of February and early in March.

"There is good reason to suppose that the meteor penetrated our air strata so far as to arrive in a compact form and still luminous to within seven or eight miles of the earth's surface, but more exact observations can alone enable trustworthy figures to be deduced."

COMET 1910a.—Further light is thrown on the time and circumstances of the discovery of comet 1910a by Mr. Innes in a communication published in No. 4389 of the *Astronomische Nachrichten*, p. 338.